

These and other warnings issued by the San Juan station and the Central Office were disseminated to West Indian stations and to stations on the Gulf and Atlantic coasts. They were also sent by Navy Radio to vessels at sea.

On Sunday, the 11th, when there were indications that this disturbance was moving northward over Haiti, the following advisory information was issued from the Central Office:

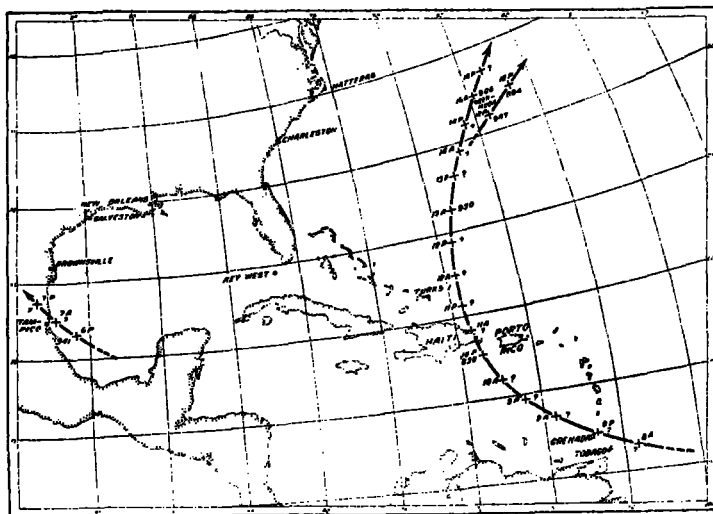


FIG. 1.—Path of hurricane of Sept. 8-15, 1921.

Advisory, 10 p. m. Tropical storm has moved northward and to-night its center is over northwestern Haiti. Future movement uncertain but probably northward. Shifting gales over and to eastward of the Bahamas during the next 36 hours.

This disturbance, as stated in the opening paragraph, moved northward from Haiti, and on the morning of the 14th notification was sent the Bermudas that the disturbance was moving northeastward toward these islands. Its center passed near the Bermudas the morning of the 15th, when the pressure fell to near 29 inches with winds of hurricane force.

The night of the 15th the following communication was sent the Office of Naval Communications, Navy Department, Washington, D. C.:

Please broadcast the following tonight: "Storm of hurricane intensity moving northeastward from the vicinity of Bermudas. It will pass onto transatlantic steamship lanes during Friday and continue to move eastward with unabated intensity."

As previously stated this storm was apparently the one charted over Iceland the morning of the 22d, when the barometer stood at 28.70 inches with wind of gale force. It is a remarkable coincidence that at the time the southern hurricane was centered north of Haiti that the steamship *Capillo* reported by radio having encountered on the 12th a hurricane of small diameter, barometer below 29 inches, near and immediately southeast of the Bermudas, moving rapidly northeast. This disturbance was separate and distinct from the primary disturbance herein referred to. Moreover, immediately preceding the appearance of the tropical storm in the eastern Caribbean Sea, there were signs of a disturbance over the southwest Gulf of Mexico, as indicated by reports by radio from vessels in that region. It passed on to the Mexican coast during the 7th and was dissipated, but there is reason to believe that the phenomenal rains in southern Texas on the 9th and 10th were associated with this disturbance. Conceding that the disturbance that appeared on the 8th southeast of Barbados was in existence previously to that date, it follows that from

the 6th to 14th there were three storms of a tropical nature over the southern waters at approximately the same time.

The paths of these disturbances will be found elsewhere in this number of the REVIEW.

In the Washington Forecast District no storm warnings were issued or required for the east coast of the Gulf of Mexico and for the Atlantic coast south of Cape Henry.

For the Atlantic coast north of Cape Henry.—Southwest storm warnings were ordered on the 11th for the coast at and north of Delaware Breakwater, when a disturbance of marked intensity was over the Great Lakes and moving northeastward, and strong winds, at times reaching gale force, occurred over the stretch of coast where warnings were displayed. On the 25th southwest storm warnings were displayed on the coast at and north of Delaware Breakwater when a disturbance of considerable intensity was centered north of the Great Lakes and moving eastward toward the St. Lawrence valley, and it was attended by strong south shifting to west winds during the night of the 25th along the coast north of Sandy Hook. On the 30th southwest storm warnings were displayed on the coast between the Virginia Capes and Eastport, Me., when a disturbance of marked intensity was central over the Great Lakes and moving eastward: the conditions forecast occurred along the coast covered by warnings, the maximum velocity being 56 miles an hour from the south at New York City.

On the Great Lakes.—Storm warnings were displayed on one or more of them on the 17th, 20th, 21st, 25th, 26th, 28th, 29th, and 30th. On the 17th the display was that of southwest warnings on Lakes Erie, Huron, and Ontario, when a disturbance of considerable intensity had its center north of Lake Superior. On the 20th the display was for strong south to west winds on Lakes Erie, Huron, Michigan, and Superior except the extreme west portion, the disturbance at the time of the display being central north of Minnesota, and on the morning of the 21st the display of southwest warnings was extended to Lake Ontario. The disturbance on the morning of the 21st was central north of Lake Superior and moving east-northeastward. It was attended by strong south to west winds and gales over the entire region of the Great Lakes. The morning of the 25th northwest storm warnings were displayed on Lakes Huron, Erie, and Ontario, when a disturbance of considerable intensity was central north of Lake Huron and moving eastward. This disturbance produced northwest winds on Huron and extreme eastern Superior, but no winds of consequence elsewhere. On the evening of the 28th northwest storm warnings were displayed on western Lake Superior, and the morning of the 29th southwest warnings were ordered for eastern Lake Superior and for Lakes Michigan, Huron, and Erie, and on the morning of the 30th for Lake Ontario, in connection with a disturbance of the Alberta type. This disturbance increased markedly in intensity during the night of the 29th, and during the 30th it was attended by general gales on the Great Lakes, except western Lake Michigan. The maximum wind velocity reported was 76 miles from the southwest the afternoon of the 30th on extreme eastern Lake Erie.

No abnormally cold weather occurred in the Washington Forecast District during the month, although frosts occurred during the third decade at a number of points along the northern border.

CHICAGO FORECAST DISTRICT.

Fire-weather warnings and forecasts were continued to the district forester at Missoula, Mont., for distri-

bution to the National Forests until September 8, when they were terminated because of the general rains which set in over the State on that day and night, making the warnings no longer necessary.

Fire-weather warnings were sent to the forest supervisor at Cass Lake, Minn., from September 7 to 9, inclusive, for use of the National Forest in that vicinity; and to the State forester at St. Paul, Minn., beginning with September 29 for distribution to the State forests under his supervision.

Because of the unseasonably warm weather during the month of September general frost warnings were not necessary. They were, however, sent to the northwestern States on several days where the temperature was low as compared with other portions of the Chicago District. These warnings were, as a rule, fully verified.

While the temperature in the Wisconsin cranberry-marsh region was considerably above the normal during most of the month, nevertheless frost warnings were necessary upon several dates. By the end of the month the crop had been harvested in practically all the marshes and the growers gave the usual credit to the Weather Bureau for its advices, which made it possible for them to flood their properties in advance of all critical temperatures. As a consequence there was no loss suffered through frosts.

Several letters have been received from the growers testifying as to the value of the warnings and extracts are given from two of these.

Mr. C. L. Lewis, manager of the Badger Cranberry Co., Beaver Brook, Wis., writes as follows:

I have just completed my harvest for 1921 and am glad to report that I have now under cover a very nice crop which will amount to about 1,800 barrels, with a very good price in prospect. Mr. Colton is also through and we will not need further frost warnings this season.

I will take this occasion to thank you for the valuable service that you have rendered us during the season just passed, and I hope that you may favor us with a visit during the coming year so that we may show you how we have progressed since you were last here.

Mr. Alexander E. Grimshaw, of Mather, Wis., sends the following contribution:

These warnings are distributed as soon as received by means of telephone service and are sent over the several lines whereon the marshes are situated. The value of this service can not be overestimated. Many times in event of sudden changes and severe frosts these warnings have been the means of saving the crops and have resulted in the savings of thousands of dollars. It would be looked upon as a great calamity to all growers of cranberries should the service be discontinued.—H. J. Cox.

NEW ORLEANS FORECAST DISTRICT.

The weather was free from damaging winds on the Texas and Louisiana coasts and was unusually warm. Neither storm warnings nor frost warnings were issued or required, but a warning of northerly gales at Tampico, Mexico, was issued on the morning of the 7th, in connection with a moderate tropical disturbance, and was justified.

The feature of the month was the torrential rainfall in central and southwestern Texas on the 8th-10th, due to the tropical disturbance which passed Tampico on the 7th, moving north-northwestward from the southwestern portion of the Gulf up the Rio Grande Valley and causing a mass of warm, moist air to move with more than normal velocity against the abrupt elevations of central Texas. Forecasts of precipitation, based on the movement of the disturbance, were made for south Texas on the 7th, 8th, and 9th.

In general, the conditions were unfavorable for extended forecasts for the benefit of harvesting and other interests, but on the 21st a forecast of fair weather in

Oklahoma for the following 60 hours was issued. Fair weather prevailed as forecast.—R. A. Dyke.

DENVER FORECAST DISTRICT.

An unusual number of Lows advanced across this district from California or the southwestern portion of the Rocky Mountain Plateau, while, with one exception, all of the HIGHS that affected the weather conditions in the southern Rocky Mountain States approached from the coasts of Washington, Oregon, or northern California. Generally light, scattered showers occurred in portions of the district from the 1st to the 3d, the 11th to the 13th, on the 15th and 16th, the 17th and 18th, and the 23d and 24th. More general rains set in over Arizona on the night of the 29th-30th and extended northeastward to southern Utah and western Colorado by October 1, with excessive amounts in western Arizona.

Forecasts of frosts were issued for the higher elevations, as follows: On the 3d, for Utah and northern Arizona; 4th, southern Utah and northern Arizona; 8th, northern Arizona; 10th, Colorado, New Mexico, northern Arizona and Utah; 12th, Utah; 13th, Colorado and Utah; 20th Colorado, northern New Mexico, northern Arizona, and southern Utah; 21st, northern New Mexico, northern Arizona and Utah; 29th, northern New Mexico, northern Arizona and Utah. Warnings of frosts at all elevations in eastern Colorado were issued on the 11th; in northern and western Utah on the 16th and 20th; the western valleys of Colorado on the 21st and 26th, and for the entire State of Colorado on the 29th. Forecasts of freezing temperatures in the mountains of Colorado were made on the 6th, 8th, 10th, 17th, and 26th, and at all elevations in extreme north-central Colorado on the 29th.

These warnings were justified by the occurrence of frosts, or by temperatures at which frosts might be expected in those sections, except on the 11th in northern northern New Mexico, Arizona, and Utah, on the 14th in Utah, and in eastern Colorado on the 12th. In the instance last named, when frost was expected at all elevations in the section specified, the area of high pressure advanced eastward more rapidly than was indicated at the time the warning was issued.

Light frost that was not forecast occurred at Flagstaff on the 8th and at Gallup on the 24th. A heavy frost, also without warning, was reported from Salt Lake City on the 20th, although the minimum temperature at that station was 42°.

In a special forecast that was issued for the Gunnison and Uncomphagre fruit valleys on the 20th, temperatures near freezing were predicted for the following night. The thermometer readings on the morning of the 21st ranged from 28° to 34°. A forecast of temperatures about freezing was also issued for the same valleys on the 29th, and the readings on the morning of the 30th ranged from 29° to 35°. The damage in both instances appears to have been confined to tender vegetation.—J. M. Sherier.

SAN FRANCISCO FORECAST DISTRICT.

The month opened with a period of unsettled and showery weather covering the first two days in California and the southern Plateau and the first eight days in western Washington. On the 18th a storm from the north Pacific passed inland far enough south to give the first general rain over the north Pacific States. There was a showery period over northern California on the 17th, 18th, and 19th and again on the 25th. Ample warnings were issued to fruit and raisin driers and no damage resulted. On the 30th a storm of the Sonora type caused heavy rains